

REMARKS

Claims 1-21 were pending in the present application. Claims 2, 5, 6, and 18 were cancelled. Claims 1, 3, 4, and 16 were amended. Accordingly, claims 1, 3, 4, 7-17, and 19-21 are now pending in the present application.

The Examiner objected to the drawings for not showing every feature of the invention specified in the claims. Claims 5 and 6 have been cancelled to overcome the objection.

Claim 20 is objected to for informalities. Due to the foregoing amendments, Applicant believes the objection to now be moot.

Claims 1, 7, 8, and 15-17 stand rejected under 35 U.S.C. §102(b) as being anticipated by Dukhan et al. (U.S. Patent Number 6,401,463) (hereinafter “Dukhan”). Applicant respectfully traverses at least portions of this rejection.

Claims 9 and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dukhan. Applicant respectfully traverses this rejection.

Claims 2-5, 11-13, and 18-21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dukhan in view of Alexander et al. (U.S. Patent Number 5,823,005) (hereinafter “Alexander”). Applicant respectfully traverses this rejection.

Claims 6 and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dukhan in view of Alexander and in further view of York et al. (U.S. Patent Number 5,010,736) (hereinafter “York”). Applicant respectfully traverses this rejection.

Applicant notes that silence with regard to any of the Examiner's rejections is not an acquiescence to such rejections. More particularly, silence with regard to the Examiner's rejection of a dependent claim, when such claim depends from an

independent claim that Applicant considers allowable for reasons given herein, is not an acquiescence to the rejection of the dependent claim(s), but rather a recognition by Applicant that such previously lodged rejection is moot based on Applicant remarks and/or amendments relative to the independent claim (that Applicant considers allowable) from which the dependent claim(s) depend.

Applicant's claim 1, as amended, recites

“A system for cooling electronic assemblies, said system comprising:
an equipment enclosure configured to receive a plurality of electronic
assemblies in a plurality of mounting locations; and
a cooling manifold mounted to said equipment enclosure and positioned to
distribute chilled air to each of said plurality of electronic
assemblies through a plurality of orifices;
wherein said cooling manifold includes a plurality of vortex tubes each
positioned to generate and provide said chilled air to a respective
one of said plurality of electronic assemblies through a respective
one of said plurality of orifices.”

The Examiner asserts the combination of Dukhan and Alexander teaches the limitations recited in Applicant's claim 1. More particularly, the Examiner acknowledges that Dukhan does not teach using a separate cooling system for each assembly. However, the Examiner asserts Alexander shows “this feature to be old in the electronics cooling art with each heat exchanger which receives precooled air having an expansion means 119.” The Examiner further asserts it would have been obvious to modify the invention of Dukhan by providing a cooling system for each electronic assembly to improve the control over the cooling to the respective assemblies.

Applicant respectfully disagrees with the Examiner's assertions. Specifically, Dukhan teaches in FIG. 4 and at col. 5, lines 7, 20

“Instead of introducing the cold airstream directly into the upper chamber 32 as done in FIG. 2, or into a heat exchanger as done in FIG. 3, a conduit 90 is provided with preselected openings so as to form air jets. These

openings can be placed adjacent specific electronic components, or nozzles may be used to direct a blast of air to the components so that these components are cooled to a lower temperature than the average temperature of the chamber. The same would be true of the FIG. 3 version where particular components can be placed, for example, on cold plates so that there is better heat transfer and the particular component can be brought to a lower temperature than the average temperature of the chamber in which the component is located.”

From the foregoing, Dukhan teaches using a single vortex tube and multiple jets to cool individual assemblies. Further, Dukhan teaches using multiple cold plates for further cooling of each assembly. Thus, it is clear that Dukhan anticipates the need for cooling each individual assembly. However, Dukhan chooses to use cold plates with multiple cooling jets.

Alexander teaches at col. 3, lines 23-30

“a vacuum pump unit 116, a heat exchanger assembly 118 affixed to each processor 114, an expansion device 119 and an air distribution conduit 120 connecting each heat exchanger assembly with vacuum pump unit 116. The air distribution conduit 120 provides an air pathway between the vacuum pump unit 116 and the heat exchanger 118.”

From the foregoing description, Alexander teaches using a specific cooling system including a vacuum pump system and individual heat exchanger units to cool individual components (e.g., processors).

As described above, Dukhan anticipates the need for cooling each individual assembly and then Dukhan chooses to use a single vortex tube and multiple cooling jets in conjunction with cold plates to solve the problem. Alexander solves a similar problem using multiple heat exchanger units. Neither reference teaches or even fairly suggests using “a plurality of vortex tubes each positioned to generate and provide said chilled air to a respective one of said plurality of electronic assemblies through a respective one of said plurality of orifices” as recited in Applicant’s claim 1.

In addition, Dukhan discloses at col. 1, lines 51-54 “Vortex tube cooling systems, however, are not as efficient as ordinary refrigeration units. Also, vortex tube systems are noisy and add more inefficiencies if the necessary air compressor is located at a distance from the vortex tube.”

From the above, it appears Dukhan teaches away from using more than one vortex tube for cooling. Accordingly, Applicant fails to see any motivation (either inherent or explicit) in either reference to combine the references. Furthermore, Applicant asserts even if, *arguendo*, one were to combine the references, one would not arrive at Applicant’s invention.

In regard to the rejection of claim 9, the Examiner acknowledges that Dukhan does not teach using a horizontal manifold. The Examiner further asserts it would have been obvious to use a horizontal duct to reduce the vertical dimension. Applicant submits claim 9 recites in addition to further recites “wherein said cooling manifold is mounted horizontally within said equipment enclosure and includes a length that extends around a perimeter of an inside surface of said equipment enclosure.” This is neither taught nor suggested in any of the references.

York discloses a system in which a first and second cooling system are used to cool electronic assemblies. More particularly, York teaches using an evaporator and condenser in the first cooling system and a single vortex tube in the second cooling system.

Accordingly, Applicant submits that claim 1, along with its dependent claims patentably distinguishes over Dukhan, over Dukhan in view of Alexander, and over Dukhan in view of Alexander, and in further view of York for the reasons given above.

Applicant’s claim 16 recites features that are similar to the features recited in Applicant’s claim 1. Accordingly Applicant submits claim 16, along with its dependent

claims patentably distinguishes over Dukhan, over Dukhan in view of Alexander, and over Dukhan in view of Alexander, and in further view of York for at least the reasons given above.

Applicant's claim 21 recites

"A cooling manifold for providing chilled air to electronic equipment, said cooling manifold comprising:

a plurality of vortex tubes distributed along a length of said cooling manifold, wherein each of said plurality of vortex tubes is configured to generate a portion of said chilled air;

an intake manifold configured to distribute compressed air received at an inlet to said plurality of vortex tubes;

an exhaust manifold configured to exhaust warm air away from said plurality of vortex tubes."

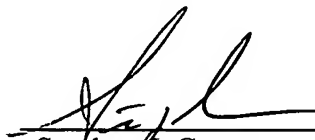
For the reasons given above in the arguments directed to claim 1, Applicant submits that none of the cited references taken singly or in combination teach or suggest the combination of features recited in Applicant's claim 21. Thus, Applicant submits claim 21 patentably distinguishes over over Dukhan, over Dukhan in view of Alexander, and over Dukhan in view of Alexander, and in further view of York.

CONCLUSION

Applicant submits the application is in condition for allowance, and an early notice to that effect is requested.

If any fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 501505/5681-73000/SJC.

Respectfully submitted,



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